

Appendix: Cohort details and noise assessment [posted as supplied by author]

1. Cohorts Details

1.1 FINRISK

The national FINRISK Study is a large population survey on risk factors of chronic non-communicable diseases in Finland.¹⁻² Every five years since 1972, stratified random samples of population aged 25–64 years have been drawn from Population Information System. Unique personal identity codes have been used to link data from different population registers.

1.2 SNAC-K

The Swedish National Study of Aging and Care in Kungsholmen is an ongoing longitudinal study aiming to investigate the ageing process and identify possible preventive strategies to improve health and care in elderly adults.³ The study population consists of randomly sampled individuals ≥ 60 years old and in a central area of Stockholm (Kungsholmen) between March 2001 and June 2004. The sample was stratified for age and year of assessment giving sub-cohorts with 60, 66, 72, 78, 81, 84, 87, 90, 93, 96, and 99+ year olds. Information was collected through social interviews, assessment of physical functioning, clinical examination (incl. geriatric, neurological and physical assessments) as well as cognitive assessment. At baseline, information regarding events prior to the study period was gathered. The follow-up interval is six years for the younger age cohorts, and three years for the older age cohorts (81+). During the follow-up intervals, medical events of all subjects are registered through linkage with primary care registry and hospital discharge registry (available for all subjects in Sweden). In case of death, hospital and cause of death registries provide the clinical information, and informant interviews are carried out. The same protocol as for the baseline data collection is used during the follow-up, though only concerning the follow-up period. Website of study: <http://www.aldrecentrum.se/snack/index.htm>. Any outcomes based on the Swedish

nationwide health registries (such as the myocardial infarction and stroke registries, the cause-of-death register and the national patient register) have been used.

1.3 SALT

The Stockholm Screening Across the Lifespan Twin study (SALT) & Twin GENE (subcohort) was set-up to screen all twins born in Sweden before 1958 for the most common complex diseases with a focus on cardiovascular diseases.⁴ Twin Gene is a sub-study involving establishing a biobank with DNA and serum from SALT participants. SALT is based on a telephone interview, involving twins that were living in Stockholm County within the “Swedish national Twin Registry”. Recruitment took place between 1998-2002. Information concerning birth order and weight, zygosity, contact with twin partner and family constellation, diseases, use of medication, occupation, education, life style habits, gender- and age specific (hormone replacement therapy) and memory problems (age > 65) was collected. In Twin Gene, twins born before 1958 were contacted 2004-2008, a total number of ~2,500 participants was available. Health and medication data were collected from questionnaires. Blood sampling material was mailed to study subjects, who contacted a local health care centre for blood sampling and a health check-up. Height, weight, circumference of waist and hip, and blood pressure was measured and blood was collected. Any outcomes based on the Swedish nationwide health registries (such as the myocardial infarction and stroke registries, the cause-of-death register and the national patient register) have been used.

1.4 60 y olds

The 60 year olds cohort is a study aiming to identify biological and socio-economic risk factors and predictors for cardiovascular diseases.⁵ Recruitment took place between August 1997 and March 1999. A random sample of every third man and woman living in Stockholm County, who was born between 1 July 1937 and 30 June 1938, was invited to the 60 year olds study. In total ~4100 subjects were included. Height, weight, BMI, Waist/Hip ratio and resting ECD, blood pressure and fasting blood samples were taken during a physical examination, while a comprehensive questionnaire was completed, including information on socioeconomic, medical and life-style

factors. The study was supplemented 2003 by the IMPROVE project (an ongoing multi cohort study into genetics and cardiovascular diseases). In Stockholm, IMPROVE is a sub-cohort consisting of ~500 participants from the 60 year olds cohort with inclusion criteria of having at least three risk factors for the metabolic syndrome. For IMPROVE, three follow-ups were conducted, blood and urine were collected, socio-economic data, quantitative B-mode ultra sound examination of carotid arteries and replicate B-mode ultrasound was performed, and vascular events were recorded. Any outcomes based on the Swedish nationwide health registries (such as the myocardial infarction and stroke registries, the cause-of-death register and the national patient register) have been used.

1.5 SDPP

The Stockholm Diabetes Preventive Program (SDPP) is a population-based prospective study, aimed at investigating the aetiology of type 2 diabetes and developing prevention strategies for type 2 diabetes.⁶ An initial survey included all men and women in the targeted age group in Stockholm County; for men in four municipalities (Värmdö, Upplands Bro, Tyresö and Sigtuna), and for women these four plus a fifth municipality (Upplands Väsby). All were screened by a questionnaire regarding presence of own diabetes and diabetes in relatives. Subjects with family history of diabetes (FHD) and randomly selected subjects without FHD, all without previously diagnosed diabetes, were invited to a health examination. This baseline study, 1992-1994 for men and 1996-1998 for women, comprised 7949 subjects, aged 35-56 years, and about 50% had FHD. In the follow-up study 8-10 years later, 2,383 men (2002-2004) and 3,329 women (2004-2006) participated. At the health examinations, both at baseline and follow-up, an extensive questionnaire (information on lifestyle factors, such as physical activity, dietary habits, tobacco use, alcohol consumption, health status, socioeconomic status and psychosocial conditions) was completed. Diabetes heredity was confirmed and measurements of weight, height, hip and waist circumference as well as blood pressure were performed. In addition, an oral glucose tolerance test was made, and blood was sampled at fasting state and 2 hour after glucose intake. Outcomes based on the Swedish

nationwide health registries (such as the myocardial infarction and stroke registries, the cause-of-death register and the national patient register) have been used.

1.6 DCH

The Danish Diet, Cancer, and Health (DCH) cohort consists of 57 053 people from the two largest cities in Denmark, Copenhagen and Aarhus, who were born in Denmark, aged 50-65 years, and were free of cancer at recruitment between 1993 and 1997.⁷ The cohort members were linked via unique personal identification number to the Danish Central Population Registry to obtain vital status (date of death or emigration) as well as detailed residential address history (1971-2010).

1.7 HNR

The Heinz Nixdorf Recall (HNR) study is an on-going population-based prospective cohort study, including 4,814 randomly selected participants 45 to 75 years of age at baseline (2000-2003) from three large adjacent cities (Essen, Mülheim and Bochum) of the densely populated and highly industrialized Ruhr area in western Germany.⁸ The HNR study was initiated to evaluate predictive value of coronary calcification compared to traditional and new risk factors in order to develop more effective methods of predicting cardiovascular disease in the general population. The study was approved by the institutional ethics committees and follows strict internal and external quality assurance protocols. Examination assessment included a self-administered questionnaire, face-to-face interviews for personal risk factor assessment, clinical examinations, and comprehensive laboratory tests according to standard protocols. Study design has been described in detail elsewhere.⁸

1.8 KORA

In the framework of the Cooperative Health Research in the Region of Augsburg (KORA), two cross-sectional population-representative surveys were conducted in 1994-1995 (S3 survey) and 1999-2001 (survey S4) in the city of Augsburg and two adjacent rural counties.⁹ The S3 survey was part of the WHO MONICA study (monitoring of trends and determinants in cardiovascular disease). Follow-up was carried out in 2008/2009. Main objective of the baseline investigation was

to assess health indicators (morbidity, mortality) and health care (utilization, costs), to quantify the prevalence of risk factors of cardiovascular and other chronic diseases, and to study the impact of lifestyle, metabolic and genetic factors on cardiovascular and other chronic diseases. Sampling included all inhabitants of the Augsburg region of German nationality aged 25 to 74 (n=400,000). For each of the surveys, 6,640 inhabitants of the Augsburg region were randomly drawn, resulting in 4,856 (S3) and 4261 (S4) participants, respectively (Response: 73% and 64%). Baseline examination included standardized interviews, physical examination, and blood sampling. Survival was ascertained for S3 participants in 2008 through Population Registry search and is available from the time of recruitment until 31.12.2007. Survival of S4 participants was ascertained through a combination of returned questionnaires and subsequent Population Registry search and is available from recruitment until 31.12.2008. Causes of death are recorded for all deaths from the death certificates. Morbidity follow up (incident coronary events) was tracked via questionnaires at follow up examinations, in questionnaires sent by mail (2002 for F3, 2008 for F3/F4). Cases were validated based on hospital records and primary care physician records. Incident MI information is available from the start of study until the end of 2008.

1.9 EPIC-Turin

The European Prospective Investigation into Cancer and Nutrition in Turin is part of the EPIC cohort in Italy, originally based in 4 areas based on cancer registries: the provinces of Florence, Ragusa and Varese and the city of Turin.¹⁰ A large series of healthy adults were enrolled to identify all newly diagnosed cases of cancer and other relevant chronic diseases occurring after the date of enrollment and to study the risks associated with dietary and lifestyle habits reported at baseline. The participants were contacted by media advertising, among women invited to cancer screening programs, among employees of local companies, and through nonprofit organizations such as blood donors, consumer groups, and cancer aid associations. All volunteers signed an informed consent form for the use of their individual clinical data for future research projects. The study protocol was approved by ethics committees centrally at the International Agency for Research on Cancer (Lyon,

France) and in Florence for the Italian cohorts. Specific information on previous major diseases, including cardio- and cerebrovascular diseases was collected through the EPIC lifestyle questionnaire. This baseline information, together with additional information obtained through medical record linkages, allowed us to identify and exclude prevalent cases of major coronary and cerebrovascular events.

1.10 SIDRIA-Turin and SIDRIA-Rome

The Italian Study on Respiratory Disorders in Childhood and Environment has been an extension of the ISAAC initiative in Italy (International Study on Asthma and Allergies in Childhood), a worldwide survey to analyze variations in prevalence of symptoms asthma, rhinitis, and atopic eczema. A cross-sectional survey was carried out between October 1994 and March 1995 in eight centers in northern and central Italy using standardized questionnaires (response rate=94%). Parents of first and second graders from a representative sample of primary schools, and adolescents in the third year of a representative sample of junior high schools answered a self-administered questionnaire on the child's health status, as well as their personal respiratory health status and various risk factors, including education, occupation, housing conditions, smoking habits, and traffic intensity in their area of residence. The data used within ESCAPE are from the subset of parents recruited in two metropolitan areas: Rome and Turin, in the context of a project co-funded by the Ministry of Health (Programma Strategico Ambiente e Salute, Ricerca Finalizzata ex-art. 12, 2006).¹¹ A record linkage has been performed with the Municipal Registry Office Databases to collect the residential history of parents who were living in Rome and Turin with their children at the time of the survey. In the city of Turin the project was performed through a collaboration between SIDRIA and the regional Unit of Epidemiology (ASL TO3), in the context of the Turin Longitudinal Study, a census-based cohort study following up health outcomes of people in Turin since 1971 Census of Population. It was possible to identify about 16,000 adults.

2 Noise Assessment

Since 2002 member states of the EU have been required to produce every 5th year noise maps for major roads, major railways and major airports and for larger agglomerations. ESCAPE made use of data from local assessments carried out for the first round of noise mapping in the EU (2007).^{12,13}

The noise level (L_{den} : day-evening-night equivalent level) was calculated for the most exposed façade of dwellings. National calculation methods were used in the study areas of the Finnish, Swedish, Danish (Nordic Prediction Method)¹⁴ and German cohorts (VBUS/RLS-90)¹⁵⁻¹⁶. The interim method of the EU (NMPB Routes 96)¹⁷ was applied to EPIC Turin and SIDRIA. Noise barriers and actual or estimated building heights and terrain effects from absorption and reflection in the ground were included in the modeling. To assess traffic flow, composition and speed for the full road network different methods were applied within study areas. For motorways actual traffic counts were used. For other roads, if counts were not available, traffic forecast models were used or flow was estimated from counts. For smaller roads standard traffic flow was used. For roads where no actual composition was known, standard distributions were used. For the majority of the roads the speed limit was used. Exposure at the most exposed façade with a resolution of 0.1 dB was obtained from grids (FINRISK 10x10m, Stockholm city 5x5m, Stockholm county 25x25m HNR 10x10 m, EPIC Turin and SIDRIA 5x5 m) or by using assessment point directly at this façade (DCH, KORA). The software used was CadnaA (FINRISK, Stockholm county, RECALL, KORA) and Soundplan (FINRISK, Stockholm city and county, DCH), and a general ArcGIS noise model (EPIC Turin, SIDRIA). First order reflections were included in the calculations.

In EU noise maps only levels above 55 dB L_{den} are reported. In some study areas additional noise modeling was undertaken to obtain exposure levels between 45 and 55 dB L_{den} . Local assessments procedures were centrally evaluated using the recommendations in the Good Practice Guide for Strategic Noise Mapping and the Production of Associated Data on Noise Exposure (WG-AEN

2007).¹⁸ There were minor differences in the assessment height (standard 4 m with variation between 2-5 m). We used a categorical variable of estimated exposure to traffic noise at the baseline address (<45, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, >74 dBA).

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